

C-A Unreviewed Safety Issue (USI) Form

Title of USI: **Installation of time zero counter**

Description of USI (use attachments if necessary):

**Addition of scintillation slats counters between MVD
and drift chamber at radius of 60cm in front of TOF
for pp-running at PHENIX experiment.
See attached memo for detail.**

Title and Date of Relevant SAD:

Committee Chair or ESHQ Division Head must initial all items. Leave no blanks:

ITEM	APPLIES	DOES NOT APPLY
Decision to not revise the current SAD and/or ASE at this time: The hazard associated with the proposed work or event is covered within an existing SAD and/or ASE. SAD Title and Date: <u> RHIC SAD </u> This Form and attachments, if necessary, shall be used to document the USI until the next revision of the appropriate SAD.	ETZ ETZ ETZ ETZ	
Decision to submit a revised SAD and/or ASE to the BNL ESH Committee: The hazard associated with the proposed work is not appropriately included in an SAD.		ETZ ETZ


Signature of C-A Committee Chair or C-A ESHQ Division Head

 8-6-01
Date


Signature of C-A Associate Chair for ESHQ

 8-6-01
Date

ShinIchi Esumi

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 送信日時: 2001年7月31日 8:44
 件名: t0 review
 TO: WILLIAM LENZ
 FROM: ShinIchi Esumi for T0 group
 DATE: 30 JULY 2001

This is a memo for the design and safety review and
 unreviewed safety issue (USI) document of time zero (T0)
 counter used for p+p experiment at PHENIX in 2001.
 This detector consists of 17.5mm thick scintillator (T0)
 and thin scintillator of 3mm thickness photon conversion
 rejector (PCR) in front of T0 at a radius of 60cm from the
 beam line and covers the full acceptance of time of flight
 (TOF). T0 will provide the start timing of charged track
 which passes through the TOF wall in order to make the
 particle identification of hadrons at 1-5GeV/c transverse
 momentum.

BBC and NTC system will give minimum bias trigger, and BBC
 will also give enough time-resolution for the particle
 identification, however they will not give 100% minimum
 bias trigger. To have p+p reference for the identified
 charged particle distribution to be compared with heavy
 ion collisions, it is essential to measure the distribution
 without any trigger bias, if the minimum bias trigger is
 not 100%, using T0 to get the trigger and the start timing
 is the most bias-free (clean) way to measure the distribution.
 The combination of T0 and PCR will identify the additional
 photon conversion happened in this new detector system, so
 additional back ground can be eliminated, this is also very
 important when we compare p+p with respect to A+A collisions.

T0 consists of 8 scintillation slats (BC-404) of 100cm long
 8cm wide 17.5mm thick, and each has 10cm acrylic light guide
 and Hamamatsu fine mesh PMT (H6614-01 R5924) for use in the
 magnetic field, they are glued with an optical cement (BC-600)
 both sides. PCR consists of also 8 scintillation slats
 (BC-404) of 100cm long 8cm wide 3mm thick, and each has 7 wave
 length shift fiber (BCF-92) glued in the surface of $100 \times 8 \text{ cm}^2$
 with the same optical cement (BC-600), 7*8 fibers in each side
 are connected to the same Hamamatsu PMT (H6614-01 R5924) with
 an optical grease (BC-630). All the thin (3mm) surfaces of PCR
 scintillator are painted with a reflector (BC-620) to increase
 the reflectivity. T0 and PCR are combined with black tapes after
 shielding the light individually. The light shielding will be
 done with aluminized mylar and black sheet. There are 80cm of
 fibers outside of PCR scintillator to make equal light path for

8 counters. These fiber tubes will be shielded by aluminized mylar and thermal contraction tube, where only the end will be contracted.

Figure.1 shows the schematic picture of T0/PCR detector. The 8 scintillator slats of T0 sit along the beam direction at the radius of about 60cm in front of the TOF acceptance, the light guide and PMT will be inside the space for the inner coil. PCR scintillator locates inner surface of each T0. The 8 sets of T0 and PCR placed in 7 degrees step, and odd and even number of T0 have different radial positions by 2.5cm having 4–5 mm of overrap in phi in order to minimize the dead space in the acceptance. Figure.2 shows the assembly drawing of detector support. Stainless belt of 1mm thick 75mm wide, which will be used to attach T0 support structure, is fixed around the nosecone. In between the belt and the nosecone, there is a 1mm layer of silicone gum not to lose the friction. The slide base moves in beam(z) direction to prevent from breaking the T0 counter, in case of two nosecones move to each other when B-field is on or off. For the mis-alignment in other direction (phi and radius), there will be thin (a few mm) layer of gum sponge in between light guide holder and light guide for a soft mounting. The other side of the structure is fixed in z (no slide base) as shown in the figure.3. Figure.4 shows the assembly drawing of PCR PMT and fiber mounting. The insulating plate and fiber mounting rings are made of black acryl. 8 fiber mounting pipes are fixed with the pipe fix by screwing into the fiber connection plate. The light tightness is given by the PMT housing and two O-rings in front and back. Each fiber mounting pipe has its own O-ring to shield the light in each hole. Assembled PCR PMT will be fixed on one set of T0 fix bar seen in figure.2 and 3 in both sides.

The signals from $(8+1)*2=18$ PMTs are fed into BBC type FEM boards via about 8m long Belden 8214 (RG-8) cables. The high-voltage will be supplied from the channels of additional modules in the existing BBC high-voltage LeCroy-build mainframe which is located in an existing PHENIX rack with protection for water, smoke and heat. The high-voltage will be fed to the PMTs via Belden RG-59, high-voltage cables with SHV connectors. The maximum voltage of the PMT is -2300V and it will be used at nominal -2000V or lower. 1.5m lemo cables from each PMT will be stress relieved at each support base for the PMT, the Belden cables will be stress relieved at two points, one at cable cramps on each belt and the other at the bottom of the iron yoke of the magnet.

In the following files on the web, the next items are given.

- (A) <http://www.phenix.bnl.gov/phenix/WWW/p/draft/esumi/0107/t0-review.ppt>(power point) or [t0-review.pdf](#)
- (1) Plan and status of T0
 - (2) Installation procedure
 - (3) Material list
 - (4) Figure.1 schematic picture of T0 counter
 - (5) Figure.2 T0 assembly drawing for z sliding side

- (6) Figure.3 the same for the fixed side
- (7) Figure.4 PCR assembly drawing
- (8) 8 pages of drawings of all the parts
- (9) some photos of T0 and PCR slats
- (B) <http://www.phenix.bnl.gov/phenix/WWW/p/draft/esumi/0107/t0-inst.html>(web) or t0-inst.pdf
detailed t0 installation procedure
- (C) <http://www.phenix.bnl.gov/phenix/WWW/p/draft/esumi/0107/t0-inst2.doc>(words) or t0-inst2.pdf
installation time table
- (D) <http://www.phenix.bnl.gov/phenix/WWW/p/draft/esumi/0107/t0-usi.txt>
this USI document text file